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Claims

[c1] An evaporative fuel control system for an internal combustion engine comprising:

(a) an intake passage;

(b) a canister for absorbing evaporative fuel disposed in an evaporative fuel control passage in communication with a fuel tank;

(c) an open passage to the atmosphere to communicate said canister with the ambient atmosphere;

(d) an atmosphere open/close valve disposed in said atmosphere open passage;

(e) a purge valve disposed between said intake passage and said canister;

(f) a detector of the concentration of purge which purge is taken into said engine; and

(g) a controller for performing a diagnosis of failure of the evaporative fuel control system after a predetermined purge time has elapsed, said purge time being set according to the concentration of the purge detected by said detector.

[c2] The evaporative fuel control system of Claim 1, wherein said predetermined purge time is set to be longer the

higher the concentration of the purge.

[c3] The evaporative fuel control system of Claim 1, wherein said controller performs parts of the diagnosis of failure while said atmosphere open/close valve is closed and after said purge valve has been opened for a predetermined diagnosis time.

[c4] The evaporative fuel control system of Claim 1, wherein said controller prevents updating of the purge concentration value while said failure diagnosis is performed.

[c5] The evaporative fuel control system of Claim 3, wherein said predetermined diagnosis time is set based on a temperature of fuel within the evaporative fuel control system and/or a value of the atmospheric pressure.

[c6] The evaporative fuel control system of Claim 1, wherein said controller is capable of diagnosing failure due to a large leak within the evaporative fuel control system.

[c7] The evaporative fuel control system of Claim 6, wherein said large leak results from a detachment of a fuel tank cap.

[c8] The evaporative fuel control system of Claim 1, wherein said controller performs said diagnosis of failure only when said detector detects the purge concentration

which is lower than 10%.

[c9] The evaporative fuel control system of Claim 2, wherein said predetermined purge time is calculated according to the formula $Tpurge = m_1 * (\text{Purge Concentration}) + a$, wherein

m_1 is a number between 0 and 50; and
a is a number between -500 and 500.

[c10] The evaporative fuel control system of Claim 9, wherein for purge concentrations lower or equal to 33.3%, m_1 is a number between 0 and 0.5, a is a number between 0 and 10;
for purge concentrations higher than 33.3% but lower or equal to 50.0%, m_1 is a number between 0.4 and 5 and a is a number between -100 and -50;
for purge concentrations higher than 50.0% but lower or equal to 66.6%, m_1 is a number between 4 and 15 and a is a number between -400 and -300; and
for purge concentrations higher than 66.6%, m_1 is a number between 0 and 0.5, and a is a number between 150 and 250.

[c11] A method of diagnosing a failure in an evaporative fuel control system of Claim 1, said method comprising the steps of:

(a) waiting for said predetermined purge time to

elapse;

(b) measuring a pressure within said inner tank while said purge valve is closed and said atmosphere open/close valve is open;

(c) closing said atmosphere open/close valve;

(d) opening said purge valve;

(e) measuring a pressure within said inner tank while said purge valve is open and said atmosphere open/close valve is closed; and

(f) comparing said pressure measured in step (b) to said pressure measured in step (e).

[c12] The method of Claim 10, wherein said failure is positively diagnosed when the difference between said pressure measured in step (a) and said pressure measured in step (d) is lower than a predetermined reference value when a predetermined diagnosis time has elapsed.